

example, the first to demonstrate the evolutionary history of patterns, or of certain decorative features from realistic originals. He placed together, side by side, analogous objects from all parts of the world, and often he was enabled to demonstrate the origin and modifications of modern weapons, utensils, and the like. This system has its dangers; analogy may often be mistaken for homogeneity, and it must be admitted that mistakes were occasionally made or wrong inferences suggested; but with care these may be greatly reduced, and this system of studying human productions appeals alike to the general public and to scientific men. We believe that the collections exhibited in 1874 were first offered to the University of Cambridge, but now they find a final resting-place in the museum at Oxford, where they have since been greatly added to and further elaborated.

Owing to the death of the sixth Baron Rivers in 1880, Mr. Lane-Fox succeeded to large estates in Wiltshire and Dorsetshire, and he assumed the name of Pitt-Rivers. This gave him his chance; many years previously his keen eye had noted the numerous earthworks and tumuli on Cranborne Chase, but he little thought that fortune would hand them over to his keeping.

In 1881 the General commenced excavating, and in 1887 he published the first of his four quarto memoirs on the results of his digging. Many burrows had been rifled before by antiquaries, but never had excavations been so systematically and thoroughly studied in this country. These memoirs are monuments to the princely liberality, technical skill, and conscientious attention to details that characterised General Pitt-Rivers.

In order to display the finds obtained in his excavations, Pitt-Rivers built a new museum at Farnham in Dorsetshire, and once more he gave rein to his passion for collecting, and soon an extensive and valuable ethnographical museum sprang up in this remote country village. Here, systematically arranged and described, may be seen models of the sites and excavations, and every specimen and fragment thence obtained. In order to illustrate the pottery which is found in various diggings, a comparative collection of pottery and ceramics was started which now forms a very valuable epitome of this industry in all ages and climes. In the same manner, a large comparative collection of agricultural implements has been collected. Here also is the collection of locks, upon which he based the memoir he published in 1883. The collections of general ethnography are surprisingly rich, and his well selected specimens of Benin metal work constitute perhaps the most representative series extant. Words fail to express one's surprise at finding this wonderful museum buried in the depth of the country.

At Tollard Royal, near Farnham, the General very carefully restored a thirteenth century house, which is known as King John's House—this he converted into a museum mainly designed to illustrate the rise of the art of painting; and with characteristic thoroughness he began with paintings of the twentieth and twenty-sixth dynasties.

Not far off are the Larmer Grounds, a park which has been beautifully laid out and provided with numerous picturesque large summer-houses for the use of excursionists. During the warm weather a band plays on Sunday afternoons, and large numbers of people avail themselves of the General's hospitality. In this effort to provide free and innocent enjoyment to the multitude, General Pitt-Rivers received much opposition from well-meaning but misguided sabbatarians; but in this as in so many other matters, he pursued what he considered to be his duty without being influenced by the opinions or opposition of others. He was very fond of joining the happy throngs, and he was never more pleased than when many thousands assembled on

great occasions, such as the annual races. It is gratifying to know that his liberality was never abused by unseemly conduct.

General Pitt-Rivers' written contributions to anthropological literature were very numerous, and in his time he took an active part in the work of various societies.

General Pitt-Rivers was a Fellow of the Royal Society; on more than one occasion he was President of the Anthropological Institute; and he was a Vice-President of the Society of Antiquaries. His last public appearance was when he read an address as Vice-President of the Royal Archaeological Institute at Dorchester in 1893. He was Inspector under the Ancient Monuments Protection Act of 1882, and in this capacity he visited the scheduled monuments; but even his energy was powerless to counteract the restricted powers and scope of the Act.

It would be difficult to detail the wide range of subjects that interested General Pitt-Rivers, and the remarkable knowledge he had on so many subjects. He was by no means a man whose sympathies narrowed with age. His strong physique, indomitable energy and imperious will enabled him to accomplish an immense amount of work, and his trained mind, combined with wide knowledge and sympathy, rendered that work of especial merit. Possessed of an abundance of means, he spent lavishly on his beloved science. His strenuous life was devoted to the advancement of knowledge and to the instruction and recreation of the populace.

A. C. H.

NOTES.

THE council of the Society of Arts attended at Marlborough House, on May 8, when his Royal Highness the Prince of Wales, K.G., President of the Society, presented the Albert medal of the Society to Sir William Crookes, F.R.S., "for his extensive and laborious researches in chemistry and in physics; researches which have, in many instances, developed into useful practical applications in the arts and manufactures."

THE Paris correspondent of the *Times* states that the committee of the Paris Academy of Sciences has selected as candidates for election as permanent secretary, in place of the late M. Joseph Bertrand, M. Cornu, professor at the Ecole Polytechnique, and M. Darboux Jean, of the Faculty of Sciences in Paris.

By the will of the late Mr. G. J. Symons, F.R.S., a valuable bequest is made to the Royal Meteorological Society. Mr. Symons was a great lover of old books, and had succeeded in getting together an extensive meteorological library. He bequeathed to the Society all his books, pamphlets, maps and photographs a copy of which is not already in its library. He also bequeathed his Cross of the Legion of Honour, his Albert medal, and other decorations, as well as the testimonial album presented to him by the Fellows of the Society in 1879. In addition to the above he also bequeathed the sum of 200*l.*

MR. GOSCHEN made an important announcement at the annual dinner of the Iron and Steel Institute last week. He said that, with a view to developing the power of English guns by means of improving the propellant agent, a committee has been appointed, with Lord Rayleigh as chairman, to investigate the whole subject. The reference to the committee is to carry out trials to ascertain what are the best smokeless propellants for use in existing guns of all natures and in existing small arms, and to report as to whether any modification in the existing designs of guns is desirable with a view to developing to the full the powers of any propellant which may be proposed.

THE King of the Belgians has created Mr. E. Windsor Richards, past president of the Iron and Steel Institute of Great Britain, a Knight Commander of the Order of Leopold.

THE Royal Commissioners who were recently appointed to inquire into and report upon the condition of the salmon fisheries of England, Wales and Scotland, commenced their inquiry on Tuesday.

FORTY-SIX of the sixty-five automobile vehicles which left London on April 23 for a 1000-mile trial, returned on Saturday last. From a report in the *Times*, we gather that the mechanical results of the trial have been very much what they were expected to be. That is to say, the established type of machine has proved itself entirely trustworthy, and between the Daimler, Napier and Panhard motors there has been, in the matter of "staying power," practically nothing to choose. Of the cars which entered, only four were driven by any other motive power than petroleum spirit, and of these one steamer only survived.

LETTERS received from Mr. Moore and Mr. Fergusson announce that the Tanganyika Expedition arrived at Lake Kivu on December 7, 1899, having left two of their party (Messrs. Berridge and Mathews) at the head of Lake Tanganyika. They had ascended the active volcano of Karunga, north of Lake Kivu (11,350 feet), but found only steam without lava issuing from the orifice. They arrived on the shores of Lake Albert-Edward on January 21, and on February 12 were at Fort Gerry, the English post in Zoru, near Mount Ruwenzori, which they were proposing to ascend.

SOME living specimens of the very curious blind fish of the caves of Kentucky, U.S.A. (*Amblyopsis spelæa*), may now be seen in the Zoological Society's fish-house, where they have been deposited by the Hon. Walter Rothschild. They are of a nearly uniform pale flesh colour. When exposed to the light these creatures hide themselves among the stones in the tank in which they are placed, though when shaded they seem to swim about pretty freely like other fishes, but usually keep near the surface.

THE Ancient Monuments Protection Bill was read a second time in the House of Lords on Tuesday. The measure extends the provisions of the Ancient Monument Act of 1882, and proposes that local authorities should be empowered to take over the charge of national monuments and to receive voluntary contributions towards the cost of maintaining and preserving them. Some of the London open spaces had been preserved in this manner, and there seemed no reason why the same principle should not be applied to monuments of archæological interest.

THE U.S. Congress has under consideration a Bill for the conversion of the present Office of Standard Weights and Measures into a National Standardising Bureau similar to the Reichsanstalt at Charlottenburg, and the National Physical Laboratory. The clause dealing with the work of the bureau reads as follows:—The functions of the bureau shall consist in the custody of the standards; the comparison of the standards used in scientific investigations, engineering, manufacturing, commerce, and educational institutions with the standards adopted or recognised by the Government; the construction when necessary of standards, their multiples and subdivisions; the testing and calibration of standard measuring apparatus; the solution of problems which arise in connection with standards; the determination of physical constants, and the properties of

materials when such data are of great importance to scientific or manufacturing interests, and are not to be obtained of sufficient accuracy elsewhere.

THE gold medal of the Linnean Society of London, which is annually presented alternately to a zoologist and to a botanist, has this year been awarded to Prof. Alfred Newton, F.R.S., in recognition of his important contributions to zoological science. To the general public Prof. Newton's name will be best known in connection with the latest addition of Yarrell's "British Birds" (vols. i. and ii. of which were revised and edited by him), and the "Dictionary of Birds," an admirable compendium of ornithology. As editor of the *Ibis* (1865-70), and of the "Zoological Record" (1870-72), to which for some years previously he had supplied the annual record of the literature relating to Aves, he has placed ornithologists of all nations under great obligations to him, as he has done, also, by his publications on the avifauna of Iceland, Greenland, the West Indies, the Mascarene and Sandwich Islands, and by his articles in the "Encyclopædia Britannica" and the "Dictionary of National Biography." As chairman for many years of a committee of the British Association he has been instrumental in securing the publication of valuable reports on the migration of birds and in obtaining legislative protection for the more useful species by the appointment of a close time. The medal will be presented at the Anniversary Meeting of the Linnean Society.

THE Académie Royale de Belgique announces the following prize subjects for 1900:—*Mathematical and Physical Sciences*: A description of researches on critical phenomena in physics, together with new researches upon this subject; new researches on the viscosity of liquids; study of the derived carbonates of an element of which the compounds are still little known; the variation of latitude, together with a discussion of the reasons which have been put forward to account for it; a contribution to the algebraic and geometric study of n linear forms, n being greater than 3; new researches on the thermal conductivities of liquids and solutions. *Natural Sciences*: The determination of the limits of the Comblain-aupont formation, and the place it should occupy in geological classification. Is it Devonian or Carboniferous?; researches on the modifications produced in minerals by pressure; researches on the organisation and development of a flat-worm with the object of determining whether there exist any phylogenic relationships between Platyhelminthes and Enterocœla; does a nucleus exist in Schizophytes (Schizomycetes)? if so, what is its structure and mode of division?; researches on Devonian plants of Belgium, from the point of view of description, stratigraphical position, and, if possible, anatomical characters. The value of the gold medal to be awarded for each subject is six hundred francs. Memoirs may be written in French or in Flemish, and must be sent to the secretary of the Academy by August 1.

WE learn from the *Electrician* that an instrument called the telephonograph, which is a modification of the phonograph, was recently inspected and tested by the German Postmaster-General and several engineers. Its inventor, Herr Paulsen, a Dane, has replaced the wax cylinder of the Edison phonograph by a steel band, and the style by a magnet energised by a telephone. Currents transmitted by the telephone pass through the electromagnet and create consequent poles on the steel band, and more or less the converse operation is employed for reproducing the sound. A long line can, of course, intervene between the transmitting telephone and the phonograph itself, and it is suggested that a telephone subscriber on leaving his office can set such a telephonograph to receive telephoned messages during his absence.

EXPERIMENTS on the exposure and development of photographic plates in ordinary light have recently been made by Prof. F. E. Nipher, and are described in *Science*. It appears that if a photographic plate in a camera is greatly over-exposed it may be developed in the light. A plate which should for ordinary work have an exposure of a second and a half for street or outdoor photography, may be exposed for two hours. When developed with weak hydrokinone by the light of a lamp, it gives a good positive. If the plate is held too near the lamp the light will dissolve a picture already appearing. If held too far away the plate begins to fog. By moving toward or from the lamp the proper illumination may be soon secured. It is remarkable that a street scene taken in this way shows not a moving thing on the streets. In Prof. Nipher's pictures, trams passing every two minutes, waggons, horses, pedestrians, left no trace upon the plate. But the fixed objects are shown perfectly, with their proper shadows and high lights. Prof. Nipher points out that lantern slides and transparencies may be made directly by this method without re-photographing from a negative. Röntgen ray pictures can also be obtained upon plates which have been exposed to the light of an ordinary room for a few days, by developing in the manner described. Good radiographs have been thus produced upon plates which were uncovered during exposure to the rays.

THE usual proof that the arithmetic mean of any number of positive quantities is greater than their geometric mean consists in showing that if any two of the quantities be replaced by their semi-sum, the new series has the same arithmetic mean and a greater geometric mean. This proof, however, involves the assumption that if this process of substitution be repeated indefinitely, the ultimate result will be a series of quantities each equal to the arithmetic mean of the original series. We have never seen this property proved, and it is certainly by no means an obvious truth in the general case, for the result of the repeated operations is always a fraction whose denominator is a power of 2, while the arithmetic mean of n quantities has n for its denominator. We are glad to see that Mr. G. E. Crawford, writing in the *Proceedings* of the Edinburgh Mathematical Society, recommends an alternative proof in which the number of steps is finite, and the above assumption is not made. Two such proofs are possible, both of which run on somewhat parallel lines, and Mr. Crawford refers to a text-book which appeared a few years ago for the alternative to the proof now given.

WE have received from Prof. A. Klossovsky, the energetic director of the meteorological system of South-west Russia, a very valuable contribution to climatology. The work consists of two volumes, text and charts, and embraces the large area running from about the latitude of London to the northern shores of the Black Sea and the Sea of Azov, and bounded on the east by the River Dnieper. The observations used in the discussion include those made at the stations belonging both to the Central Meteorological Service of St. Petersburg and to the South-west Russian system, and embrace a period of twenty-five years (1871-1895). The tables exhibit monthly, yearly and five-yearly values of all the principal elements, and the distribution of thunderstorms and hail. The charts are coloured, and show very clearly the mean annual distribution of rainfall, the number of days of thunderstorms and hail, mean and extreme temperatures, and the distribution of cloud and humidity. The tables are arranged in various ways, and furnish most useful statistics for agriculturists and for men of science generally.

IN describing some Neocene corals of the United States (*Proc. U.S. National Museum*, vol. xxii, 1900), Dr. H. S. Gane remarks that a majority of the corals in these Eocene, Miocene

and Pliocene formations belong to extinct species. They do not, however, present any close kinship with the corals of a like age in the West Indies, but are more nearly related to those now living in the Caribbean Sea and Atlantic Ocean.

MR. CECIL B. CRAMPTON, who has for some time been assistant to Prof. Boyd Dawkins in the museum at Owen's College, Manchester, has been appointed an assistant geologist on the Geological Survey of Scotland.

MR. LESTER F. WARD gives an account of the wonderful "Petrified Forest" or "Chalcedony Park" of Arizona (Report to Department of the Interior, U.S. Geol. Survey, 1900). Countless logs of silicified wood occur over a wide area in Arizona, but they are especially abundant in a particular tract known as the "Petrified Forest," east of Holbrook, between the Little Colorado and Rio Puerco. Here the logs lie in the greatest profusion, "while the ground seems to be everywhere studded with gems, consisting of broken fragments of all shapes and sizes, and exhibiting all the colours of the rainbow." These silicified blocks are not *in situ*, but have been derived from a bed of conglomeratic sandstone of Triassic age, which is exposed on the margin of a high plateau. Mr. Ward refers also to a well-known "Natural Bridge," which consists of a petrified trunk lying across a canyon, and forming a footbridge, and he observes that the trunk here is *in situ*. He advocates that means be taken to preserve these natural phenomena.

A REPORT on the proposed railway from the Commune des Houches, Bonneville, in Haute Savoie, to the summit of Mont Blanc, has been published by M. Joseph Vallot, Director of the Mont Blanc Observatory, and M. Henri Vallot, engineer. This great undertaking was projected by M. Saturnin Fabre, but various routes have been suggested. These are fully discussed by the authors, who give reasons for recommending a route which starts from the valley of the Arve at an elevation of about 3000 feet, and proceeds by the Aiguille du Gouter and the Dôme du Gouter to a terminus at the Petits Rochers Rouges, where the elevation is about 15,000 feet. The total length of the railway would be about seven miles, and from an elevation of about 4000 feet to its upward termination, the line would for the most part be subterranean. There would be several openings, and also stations giving access to the mountain, at points of special interest and beauty. M. Joseph Vallot contributes chapters on the geology, including the glacial phenomena, and these are illustrated by a section showing the nature of the solid rocks through which the railway would be carried, and the thickness of the glacier-ice above. For a short distance the tunnelling would be made through Liassic slates and Trias with gypsum, and then wholly through various crystalline schists.

IN his memoir recently published in the *Philosophical Transactions* (see *NATURE*, April 19, p. 595), Mr. Oldham has shown that, in recording the movements due to distant earthquakes, the heavy vertical pendulums employed in Italy answer most readily to the early tremors, while the light horizontal pendulums of Rebeur-Paschwitz and others are most affected by the later-arriving surface-undulations. Dr. G. Agamennone has discussed the same subject independently in a note read on February 18 before the R. Accademia dei Lincei of Rome. At the Roccati Papa Observatory, of which he is director, are two horizontal pendulums provided with mechanical registration. It is found that these instruments fail to indicate small local shocks, while in recording distant earthquakes they lag behind the vertical pendulums with stationary masses. But, by increasing the

weight which the horizontal pendulums carry from 25 to 60 kg., this defect almost disappears. Dr. Agamennone therefore proposes to erect an additional pair of horizontal pendulums at Rocca di Papa in which the masses shall be at least 500 kg., the period of oscillation 10 to 15 seconds, and the magnifying ratio of the writing stiles 50, and possibly 100. He also suggests a double system of registration; the stiles at one end are to write in ink on white paper moving with a velocity of about 50 cm. per hour, and at the other end on an endless strip of smoked paper, which, on the occurrence of a shock, will be made to travel still more rapidly. The former record will enable the initial and final epochs to be determined, and the latter the period of the individual oscillations.

WE have received the *Transactions and Report* of the Manchester Microscopical Society for 1899, which contains a good account of the late Zoological Congress, and also some well illustrated papers on various biological subjects of current interest.

DR. C. S. MINOT has favoured us with a copy of a paper from vol. xxix. of the *Proc. Boston Soc. Nat. Hist.*, entitled "On a hitherto unrecognised form of blood circulation without capillaries in the organs of Vertebrata." "Sinusoids" is the name proposed for the newly-discovered vessels, which are said to differ in many respects from true capillaries.

THE "Descriptive Guide" to the collection of corals now on view at the South London Art Gallery, Peckham Road, Camberwell, may be described as a wonderful "pennyworth." Not only does it contain two excellent photographic plates of corals, but the text is an excellent popular introduction to the study of these beautiful structures. The collection in question is the property of Mr. J. Morgan, of St. Leonards, who has kindly loaned them for public exhibition.

FROM its last *Report* we are glad to notice that the Felsted School Scientific Society appears in a flourishing condition. Physics and chemistry receive a larger share of attention than is usually the case in school societies, owing, doubtless, to the fact that the president, Mr. A. E. Munby, teaches these subjects in the school. Dr. Charles Hose has kindly offered to present a selection from his Bornean treasures if proper accommodation can be obtained for their display.

"CODIUM" is the title of the fourth issue of the Liverpool Marine Biological Committee's memoirs. The remarkable branching alga originally described as *Fucus tomentosus*, but now designated *Codium tomentosum*, is one of three British representatives of the group *Codiaceae*, but the only one found within the area treated of in this series of memoirs. Although widely distributed, it occurs within the district only in shallow rock-pools at the south end of the Isle of Man. The plants are perennial, and fruit in winter; the season of fructification apparently extending from November till February. The authors of the memoir have worked out the life-history of the organism so far as their materials admitted of this being done; but there are certain problems connected with the reproduction which require further investigation.

DR. R. W. SHUFFELDT contributes a paper on the psychology of fishes to the April number of the *American Naturalist*. In general it may be said that fishes possess excellent visual power, even to the exact discrimination between objects; and there is also reason to believe that they are extremely sensitive to any disturbance of their native element, when such disturbance is within the range of appreciation of their nervous organs. Whether, however, any fish has the extreme sensibility of the leech *Clepsine*, which, when the experiment is conducted with

proper precautions, will be conscious of the touch of a needle-point on the surface of the water of the dish in which it is placed, is more than doubtful. The peculiar sensitiveness to teasing exhibited by the fish known as the snowy grouper (*Epinephelus niveatus*) is instanced by the author as a phenomenon requiring special explanation. When much disturbed, this fish displays a spasm, or fit, much resembling the contortions of death, eventually floating belly-upwards, and at the same time changing colour. The author suggests that these movements are for the purpose of warning off predatory fish, which prefer to take their prey in a healthy condition after an exciting chase.

A PRELIMINARY REPORT on the Klondike Goldfields, Yukon District, Canada, has been published by Mr. R. G. McConnell. (Printed in advance from the Summary Report, Geol. Surv. Canada for 1899, 1900). The rocks consist of stratified and foliated rocks, mostly Palæozoic, and of granites and other eruptive rocks of Tertiary age. Of the older rocks, the Klondike series constitutes the country rock along the productive portions of all the richer creeks. It mainly comprises micaceous schists, greatly crushed and altered, which pass in places into a granitoid rock. Quartz veins are very abundant, and these occasionally contain free gold. The placer deposits have derived their gold from the quartz veins and silicified schists of the district; and it is considered probable that productive veins, or zones of country rock, will eventually be discovered. A fairly full account is given of the placer deposits, so far as they are known, but the author remarks that the work of the prospector will not be completed for many years. The valleys known to be productive in gold are shown on a map.

"NOTES on the Fossil Flora of South Gippsland," by Mr. James Stirling, Government geologist, have been published by the Department of Mines, Victoria (1900). The plants, which include ferns, cycads and conifers, were obtained from Jurassic strata. They are illustrated in six plates, which accompany the notes, and which were prepared under the direction of the late Sir Frederick McCoy.

MESSRS. ARCHIBALD CONSTABLE AND CO. will publish in a few weeks Mr. W. Worby Beaumont's new and comprehensive work, "Motor Vehicles and Motors: Their Design, Construction and Working by Steam, Oil and Electricity."

PROF. J. A. EWING'S standard work on "Magnetic Induction in Iron and Other Metals" (The *Electrician* Printing and Publishing Co.) has reached a third edition. A chapter has been added on practical magnetic testing, and important advances made since the book was originally published have been taken into consideration.

MESSRS. NEWMAN AND GUARDIA, LIMITED, have just placed a new quarter-plate pocket camera—the "Nydia"—upon the market. The camera is fitted with a special $5\frac{1}{2}$ -inch lens, either Zeiss, Wray or Ross make; it carries twelve films or eight plates; when folded it measures only $7\frac{1}{4} \times 4\frac{1}{4} \times 1\frac{3}{4}$ inches, and it only weighs, when loaded, $1\frac{3}{8}$ lbs. Photographers requiring a portable and efficient hand camera at a moderate price should see the "Nydia."

THE fourth edition of "Psycho-therapeutics," by Dr. C. Lloyd Tuckey, has been issued by Messrs. Ballière, Tindall and Cox. The third edition was published nearly ten years ago; and since that time hypnotism and suggestion have become recognised forms of medical treatment. Dr. Tuckey's work is a useful statement of the development of the system of psycho-

therapeutics, both from the theoretical and practical sides, and it will show practitioners what can be accomplished by hypnotic suggestion.

ALTHOUGH a large amount of work has been published upon the physical properties of dilute solutions of single electrolytes, the experimental study of solutions of mixed electrolytes, notwithstanding its great interest from the point of view of the electrolytic theory of dissociation, has not been worked at so extensively. The theoretical discussion of such mixtures leads to a set of equations somewhat difficult to solve; but since Prof. MacGregor, of the Dalhousie College, Halifax, Nova Scotia, showed how to solve these equations by a simple graphical method, systematic researches have been carried on at this college on the properties of such mixed solutions of electrolytes. A recent paper, by Mr. J. Barnes, in the *Transactions* of the Nova Scotian Institute of Science, deals with the depression of the freezing point in salts containing a common ion; and the results show that in the case of mixtures of potassium chloride and sodium chloride, and of sodium chloride and hydrochloric acid, and of all three, it is possible, with the ionisation coefficients obtained by Prof. MacGregor's method, and on the assumption that the molecular depression of an electrolyte in a mixture is the same as it would be in a simple solution of the same total concentration, to predict the depression of the freezing point within the limits of the error involved in observation and calculation.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus*, ♂) from India, presented by Lady Malcolm, of Pöltaloch; a White-crested Tiger Bittern (*Tigrisoma leucolophum*) from West Africa, presented by Mr. W. F. Marshal; four Chaplin Crows (*Corvus capellanus*) from Southern Persia, presented by Mr. B. T. Finch; a Cinereous Vulture (*Vultur monachus*), European, presented by Mr. W. E. Found; a Common Boa (*Boa constrictor*) from South America, presented by Mr. F. H. Preston; two Egyptian Foxes (*Canis niloticus*) from North Africa, two Prevost's Squirrels (*Sciurus prevosti*) from Malacca, a Ring-tailed Coati (*Nasua rufa*) from South America, two Porto Rico Pigeons (*Columba squamosa*) from the West Indies, a Sclater's Cassowary (*Casuarius sclateri*), two Red-sided Eclectus (*Eclectus pectoralis*) from New Guinea, four Loggerhead Turtles (*Thalassochelys caretta*) from Tropical seas, twelve Elegant Terrapins (*Chrysemys scripta elegans*), seventeen Lesueur's Terrapins (*Malacoclemmys lesueuri*) from North America, twelve Adorned Terrapins (*Chrysemys ornata*) from Central America, seven Reeves's Terrapins (*Damonia reevesi*) from China, deposited; five Hairy Armadillos (*Dasyurus villosus*) from La Plata, four Common Indian Starlings (*Sturnus menzibieri*), a Bengal Fox (*Canis bengalensis*) from India, two Meyer's Parrots (*Poocephalus meyeri*) from South-east Africa, four Australian Sheldrakes (*Tadorna tadornoides*), five Wood Swallows (*Artamus sordidus*) from Australia, six Sulphury Tyrants (*Pitangus sulphuratus*), a Black-pointed Teguxin (*Tupinambis nigropunctatus*) from South America, purchased; a Crowned Lemur (*Lemur coronatus*), six Common Wolves (*Canis lupus*), a Llama (*Lama peruana*) born in the Gardens.

OUR ASTRONOMICAL COLUMN

UNPUBLISHED OBSERVATIONS AT RADCLIFFE OBSERVATORY, 1774-1838.—In a pamphlet containing a reprint of an article in *Monthly Notices*, vol. lx. pp. 265-293, Dr. A. A. Rambaut, Radcliffe observer at Oxford, calls attention to a very valuable collection of astronomical observations which are pre-

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served at the Radcliffe Observatory, but have not been reduced or published. Two of the Oxford astronomers, Profs. Hornsby and Robertson, spent a large amount of labour in reducing Bradley's observations made at Greenwich from 1750-1762, and further continued his work by themselves maintaining a systematic and regular series of observations for sixty-five years, from 1774-1838. These were all made with the instruments supplied by Bird to the Radcliffe Observatory at its installation, consisting of two quadrants each of 8-feet radius, a transit instrument of 8-feet focal length, and a zenith sector of 12-feet focus. The observations have all been methodically copied in a similar form to their printed edition of Bradley's observations, and contain altogether about 130,000 transits and 60,000 zenith distances. Dr. Rambaut states that his staff at present could not undertake the reductions; but, in order to show the extreme importance of the data available, he has made a selection of them, giving the probable errors compared with other observers.

The planets and sun have received considerable attention, there being about 8000 observations of the sun alone, a number little less than that on which Leverrier's tables were founded, and, moreover, covering the period when the corrections to the mean longitude of the sun, as deduced at Greenwich, Paris and Königsberg, are most discordant.

The working list of stars includes about 4870 of those observed by Flamsteed and Bradley, so that direct comparisons could be made in the reductions. Their great value would be specially apparent in the question of proper motions, filling up as they do the long gaps between Bradley and Piazzi, or Bradley and Pond. Specimens of Dr. Rambaut's reductions are given in the paper to show the high degree of accuracy attained by the observations.

MAXIMUM DURATION FOR A TOTAL SOLAR ECLIPSE.—Mr. C. T. Whitmell, president of the Leeds Astronomical Society, recently read a paper showing the results of calculations he had made in the endeavour to ascertain what is the maximum duration possible for a total solar eclipse (*Monthly Notices*, R.A.S., vol. lx. pp. 435-441). After considering the several effects of the varying distances of sun and moon from the earth in determining size of umbra and velocity of shadow, he cites the following five conditions as required for maximum duration of totality:—

(1) The new moon, at or very near a node, must also be at the most favourable perigee possible; (2) the sun must be at apogee; (3) during totality, which should be observed at local noon, the moon's shadow should run along a parallel of latitude, in order that the diurnal movement of the observer may be for the time parallel to the motion of the moon, thereby producing its full effect in detaining him within the umbra; (4) the sun and moon should be in the zenith, so that the umbra may be as large as possible; (5) the observer should be on the equator, so that his linear velocity may be as great as possible.

Of these, owing to the sun and moon *not* moving in the plane of the celestial equator, it is impossible that (4) and (5) can be simultaneously fulfilled; (5) is more favourable than (4).

Taking the moon's horizontal parallax as 61' 22",
 " " earth's radius as 3963 miles,
 " " moon's " 1081½ miles,

and using the present accepted *eclipse* values of the diameters of the sun and moon, the maximum totality will occur near the middle of July, at noon, in geocentric north latitude about 4° 52', and will last about 7m. 40s., the sun being at apogee with a parallax of 8" 70. This is on the assumption that the declinations of the two bodies are considered practically constant during totality. The author gives the following list of long duration eclipses, calculated by Mr. Crommelin from Oppolzer's data:—

Date	Duration at noon		Position of noon point	
	h.	m.	Longitude	Latitude
1901 May 18	6	41.6	97 E.	2 S.
1919 May 29	7	5.9	18 W.	4 N.
1937 June 8	7	19.9	131 W.	10 N.
1955 June 20	7	24.5	117 E.	15 N.
1973 June 30	7	19.6	6 E.	19 N.
1991 July 11	7	10.7	105 W.	22 N.